

APPENDIX C

SUMMARY OF PREVIOUS INVESTIGATIONS AND PRE-DESIGN INVESTIGATION

Former ORP / Building 1 Area

Former Oakland Army Base - EDC Area, Oakland, California

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1. SUMMARY OF PREVIOUS INVESTIGATIONS

Previous sampling locations are shown on Figure 2. The studies and investigations summarized below in each subsection were previously conducted at or in the vicinity of the Former ORP / Building 1 Area.

1.1 INVESTIGATIONS BY U.S. ARMY

1.1.1 Pavement Repair in Parking Lot Near Building 1

The Army repaired a section of pavement adjacent to Building 1 in 1994 where “tarry residue” was observed “oozing” out of the ground through a section of buckled asphalt (IT, 2002). Two soil samples were collected from soil borings completed in the area after the asphalt was repaired. The two soil samples were collected at 4 feet bgs and were analyzed for benzene, toluene, ethylbenzene, and xylenes (“BTEX”), and total petroleum hydrocarbons (“TPH”). No BTEX was detected above laboratory reporting limits. TPH as motor oil (“TPHmo”) and total recoverable petroleum hydrocarbons (“TRPH”) were detected at concentration of 53,000 mg/kg and 790 mg/kg, respectively. The residue reappeared at ground surface after the asphalt was repaired (ICF Kaiser, 1998).

1.1.2 Basewide Preliminary Assessment and Site Inspection

The Army performed a basewide Preliminary Assessment and Site Inspection (“PA/SI”) in 1997 (Kleinfelder, Inc., 1998a). Two soil borings (K09S103 and K09S104) were advanced east of the Building 1 Area to investigate potential contamination from the former PX gasoline station (Building 42), which is an RMP Location near the Site. Soil and groundwater samples were collected from each boring and selectively analyzed for VOCs, TPH, TEPH, and metals (Kleinfelder, Inc., 1998a). Soil samples were collected at approximately 2 feet bgs. TPH as diesel (“TPHd”), TPHmo, acetone, and various metals were detected in the soil samples at concentrations below Remediation Goals. No

VOCs were detected in the groundwater samples above analytical method reporting limits.

1.1.3 Excavation in Parking Lot Near Building 1

In 1998, the Army excavated the area where Organic Residue was previously observed “oozing” from the pavement in an attempt to remove it source. The excavation area was located between former Wings 1 and 2, as indicated on Figure 2. Organic Residue was still visible along some portions of the excavation wall, but the excavation was terminated to avoid undermining Building 1. The Army collected soil and water samples from the excavation sidewalls and bottom, as well as a samples of the residue (ICF09S4 through ICF0912). In 1999, upon the completion of the excavation and backfilling, the Army installed eight soil borings (ICF09S13 through ICF09S20). Soil samples were not collected for chemical analysis from the eight borings. However, boring logs indicate that Organic Residue was encountered in four of the eight borings, at approximately 5.5 feet bgs.

Of the sidewall and bottom soil samples collected from the excavation, VOCs, SVOCs, PAHs, and TPH were detected. Of the VOCs detected, acetone was detected at a maximum concentration of 0.029 µg/kg. TPHmo and TPHg were detected at maximum concentrations of 52,300 mg/kg and 227,000 mg/kg, respectively. TPHd was not detected in any of the sidewall and bottom samples. Two SVOCs, 1,2,4-trichlorobenzene and 2-methylnaphthalene were detected at concentrations of 5.84 µg/kg and 458 µg/kg, respectively. Fluorene, naphthalene, and phenanthrene were the only PAHs detected at concentrations of 519 µg/kg, 186 µg/kg, and 1,720 µg/kg, respectively.

1.1.4 Remedial Investigation

The Army performed a Remedial Investigation (“RI”) of the Site in 1998 and 1999 to evaluate the extent of the residue in the area of the excavation (IT, 2002). Soil and groundwater samples were collected from borings advanced in and adjacent to the excavation area. Residue was observed in some of the borings at a depth ranging from 4 to 6 ft bgs.

Analytical results of soil samples collected from the residue indicated that VOCs, TPHd, TPHg, and PAHs, and metals were present in the organic residue. Two additional boreholes were also advanced in the vicinity of former PX gas station / Building 42 RMP Location that is near the Building 1 Area (borings ICF09S2 and ICF09S3). VOCs, TPHg, metals, and PAHs were detected in soil at concentrations less than Remediation

Goals. BTEX compounds were detected in groundwater samples at concentrations less than Remediation Goals.

Based on the findings of the RI and the observance of Organic Residue extending beneath Building 1, the Army initiated historical document reviews for the Oakland Army Base, including the Building 1 Area (IT, 2002) to ascertain the possible source of the residue. The Army found historical aerial photographs and other documents indicating that an oil reclaiming plant had operated in the area from as early as 1924 through 1941. The historical aerial photographs showed clear evidence of above ground storage tanks and the presence of a dark ground stain surrounding the ORP and above ground storage tanks.

1.1.5 Storm Drain and Sanitary Sewer Line Investigation

The Army investigated sanitary sewer lines and storm drains west of the Site in 1999 (IT, 1999). Two soil borings (ICF10S27 and ICF10S28) was advanced west of the Building 1 Area as part of this investigation. Soil and groundwater samples were collected from each boring and analyzed for VOCs. No VOCs were detected in the soil samples collected. Low concentrations of VOCs were detected in the groundwater samples. No other VOCs were detected in groundwater samples.

1.1.6 Supplemental Remedial Investigation

The Army performed supplemental RI's in 1999 and 2000 to determine the nature and extent of contamination in the vicinity of the former ORP (IT, 2002). The supplemental RI efforts consisted of advancing soil borings in a grid pattern in the area where the ground stain was visible on the aerial photographs and collecting and analyzing soil and groundwater samples for potential chemicals of concern. A total of 28 soil borings were completed (9S21 through 9S48) as part of the supplemental investigations. Soil, residue, and groundwater samples were collected from the borings and selectively analyzed for VOCs, PAHs, TEPH, and metals. TPHd, TPHmo, lead, and various PAHs and VOCs were detected in soil and residue samples at concentrations that exceed Remediation Goals. However, no COCs were detected in groundwater samples at concentrations that exceed Remediation Goals.

1.1.7 Sanitary Sewer Video Investigation by the OARB

In September 2000, the Army conducted a video camera survey of the sanitary sewer lines. The sanitary sewer lines west of Building 1 wing 1 were observed to contain a gray-black greasy substance extruding through the joints of the pipe (IT, 2002). The sewer lines could not be further examined due to the greasy nature of the substance,

which inhibited the movement of the video camera. The Army concluded that groundwater was infiltrating into the sewer lines.

1.1.8 Supplemental Site Investigation

In December 2001, the Army performed a supplemental site investigation to further characterize the nature and extent of contamination in the subsurface (IT, 2002). The investigation consisted of excavating three exploratory trenches (trenches T-1, T-2, and T-3), advancing ten soil borings (IT9S54 through IT9S56, IT9S59 through IT9S61, and IT9S63 through IT9S66), and collecting and analyzing soil and groundwater samples for potential chemicals of concern.

VOCs, PAHs, dioxins and furans, TPH, and metals were all detected in the soil and residue samples collected during the December 2001 investigations. TPHd, TPHmo, and lead were detected in soil and residue samples at concentrations that exceed Remediation Goals. However, no chemicals were detected in groundwater samples above Remediation Goals during the December 2001 investigation.

1.2 INVESTIGATIONS BY OBRA AND THE PORT OF OAKLAND

1.2.1 Storm Drain and Sanitary Sewer Investigation by Port of Oakland

The Port of Oakland investigated storm drain / sanitary sewer lines in 1994 as part of an investigation of Berths 8 and 9 for possible replacement of a portion of the storm drain system (ERM-West, Inc. 1994). Four soil borings were advanced west of the Building 1 Area as part of the investigation (IT, 2002). Two soil borings (ERM-SB-1 and ERM-SB-2) were advanced as part of the storm drain investigation, and two more (ICF10S27 and ICF10S28) were advanced as part of the pipeline investigation. Soil samples were collected from all four borings. Two groundwater samples were also collected from the pipeline investigation borings. No chemicals were detected in soil or groundwater at concentration greater than Remediation Goals.

1.2.2 Investigation of Tar-Like Substance in Building 1 Crawlspace by City of Oakland

In October 2000, City of Oakland employees discovered a tar-like substance in the crawlspace of Building 1 Wing 1. The substance was extruding from the subsurface through a small gap between a wooden piling and the concrete “rat slab”. The Army collected two samples of the substance, once in October 2000 and again in September 2001, and analyzed the samples for a wide range of chemical constituents and physical

properties. The City of Oakland collected three samples of the substance in February 2001 (BLDG 1A, BLDG 1B, and BLDG 1C) and analyzed the solid and liquid fractions of the substance for selected chemical constituents and physical properties. VOCs, SVOCs, PCBs, dioxins and furans, metals, and TPHd were all detected at elevated concentration in the samples of tar-like material. The samples also had pH levels ranging from 0.56 to 1.3.

1.2.3 Treatability Test Investigation by OBRA

In January 2003, OBRA conducted treatability tests and associated field activities at the former ORP / Building 1 Area. The results of the investigation and treatability tests are summarized in *Treatability Test Field Activities Report, Former ORP / Building 1 Area, Oakland Army Base, Oakland, California* (EKI, 2003b).

The field activities consisted of excavating 15 trenches and collecting soil samples of the various identified soil layers for selected chemical analysis. Soil samples were collected from Overburden, Organic Residue, Stained and Oily Soil, and the underlying clayey and sandy sediments. Organic Residue was observed to be located generally north of the former wooden bulkhead associated with the former ORP (Figure 2) and ranged in thickness from 2 to 18 inches.

The analytical results of 12 overburden soil samples collected indicated that no COCs were detected above Remediation Goals. The analytical results of the six samples collected from the organic residue indicated that the organic residue layer, once excavated from the subsurface, will likely display the D008 toxicity characteristic for lead under RCRA hazardous waste regulations, i.e., the TCLP-leachable lead greater than 5 mg/L. Additionally, the pH of seven of the nine residue samples collected was less than 2, and total lead was measured at concentrations as high as approximately 4,600 mg/kg, exceeding the Remediation Goal of lead. VOCs, PAHs, TPHd, TPHmo, and metals were also detected in the organic residue samples above RAP goals. No COCs were detected above Remediation Goals in the stained and oily soil or the clayey and sandy sediments, where sampled as part of this treatability study.

During trenching activities, groundwater was tested in the field at 11 trenches for pH. The pH of groundwater from five of the 11 trenches (OBRA-T01, OBRA-T02, OBRA-T07, OBRA-T08, OBRA-T10) ranged from 0 to 2. The trench locations are shown on Figure 2.

2. RESULTS OF PRE-DESIGN INVESTIGATION

To aid in preparation of the Contract Documents, in particular the Technical Specifications and Construction Drawings for OBRA's competitive bidding of the remediation activities, OBRA conducted a focused, pre-design investigation of subsurface conditions at the Site on 11 through 19 December 2003. With the concurrence of DTSC, the pre-design investigation was conducted in accordance with the *Pre-design Investigation Memorandum*, dated 19 November 2003 (EKI, 2003c). The pre-design investigations, conducted on behalf of OBRA by Ninyo & Moore, were planned with, and completed to augment, existing characterization data as obtained by the Army, OBRA, and the Port of Oakland (See Section 1 above).

2.1 SAMPLING OBJECTIVES

The pre-design investigation was a focused investigation intended to obtain additional visual descriptions of encountered soil and waste layers, soil physical parameter data, and limited chemical data that would be useful for finalizing remedial design decisions and to provide information to bidding remediation contractors. The specific objectives of the pre-design investigation were to:

- (1) perform Cone Penetrometer Tests ("CPTs") to assess lithologic stratification, density, and consistency of subsurface soils to aid planning of excavation, and to correlate the CPT data with available chemical data and visual observations obtained during the treatability study and previous investigations by the Army, thereby calibrating the CPT as a tool to aid in further definition of the vertical extent of Building 1 Remediation Waste at the Site;
- (2) assess visually whether spongy organic residue that is likely to be Building 1 Remediation Waste, or other visually impacted soil, is present adjacent to Buildings 6 and 60 to help OBRA evaluate accessibility for waste excavation in these areas;
- (3) collect and analyze limited number of samples of overburden soil for possible use as backfill material at the Site including gathering data on soil physical parameters to aid remedial design; and
- (4) collect and analyze a limited number of samples of stained and oily soil to augment existing chemical data and evaluate the lateral extent of stained and oily

soil that is likely to contain chemicals of concern (“COCs”) above remediation goals, and to otherwise aid waste disposal classification.

2.2 FIELD PROCEDURES

2.2.1 Trenching and Visual Observation

Ninyo & Moore excavated 15 exploratory trenches at the locations shown on Figure 2. A Ninyo & Moore field geologist was on-site during all trenching activities. Daily reports prepared by Ninyo & Moore are included in Appendix B. A registered engineer from EKI was periodically present at the Site to observe the progress of the work and the subsurface conditions encountered in the trenches.

Each trench was approximately seven feet deep, four feet wide, and seven feet long. The trenches were excavated using a soft-tired backhoe to reduce potential damage to the existing covering material at the Site. To the extent practicable, overburden and unimpacted soil underlying the tarry residue or stained and oily soil were excavated separately and temporarily placed in separate stockpiles adjacent to each exploratory trench for visual inspection.

The Ninyo & Moore geologist logged soil lithology in the field during trenching. Trench logs prepared by Ninyo & Moore are included in Appendix B. Ninyo & Moore screened the work zone for hydrogen sulfide gas and sulfur dioxide gas with a gas detector, and for organic vapors with an organic vapor meter (“OVM”). Ninyo & Moore included these field measurements, as well as field notes on the layering, depth, thickness, and distribution of organic residue and other impacted soil on the exploratory trench logs, which are included in Appendix B.

2.2.2 Collecting Samples for Chemical Analysis

When Stained and Oily Soil or other impacted or unusual soil or debris was encountered in the exploratory trenches, Ninyo & Moore, collected one discrete sample of the soil for chemical analysis. Soil samples were collected from the sidewall of the trench or from the backhoe bucket using a disposable plastic scoop to transfer the soil samples to pre-cleaned brass containers. Soil samples for VOC analysis were collected from undisturbed soil in the backhoe bucket using EnCoreTM samplers by U.S. EPA Method 5035, in accordance with ASTM recommended procedures.

The samples for chemical analysis were sent under chain-of-custody, to Torrent Laboratory, Inc., for analysis of the following chemical constituents:

- Title 22 Metals by U.S. EPA Method 6010 and 7000;
- VOCs by U.S. EPA Method 8260B using Encore™ samplers by U.S. EPA Method 5035;
- Semi-volatile organic compounds (“SVOCs”) by U.S. EPA Method 8270C;
- Total Extractable Petroleum Hydrocarbons (“TPH”) quantified as diesel (“TPHd”), and motor oil (“TPHmo”) by U.S. EPA Method 8015 Modified with silica gel cleanup; and
- pH by U.S. EPA Method 9045C.

2.2.3 Collecting Samples for Physical Parameter Analysis

Ninyo & Moore collected additional soil samples from the sidewalls of the exploratory trenches for physical parameter analysis. The frequency of sample collection was determined in the field. From each trench, Ninyo & Moore generally collected at least one sample of gravelly overburden, one sample of one sample of Bay Mud, and one sample of sand found below the gravelly overburden, if encountered in selected trenches. Sample depths were finalized in the field based on the depth of the encountered material. Ninyo & Moore collected the soil samples directly from the backhoe bucket and placed the samples into sealable moisture-tight containers. Ninyo & Moore also collected at least two samples of gravelly overburden soil from two separate exploratory trenches with sufficient volume to conduct a sieve analysis. If sand was encountered below the overburden in an exploratory trench, Ninyo & Moore collected a sufficient volume of sand for sieve analysis.

Ninyo & Moore analyzed several soil samples for the following physical parameters:

- moisture content by American Society of Testing and Materials (“ASTM”) method D2216; and
- grain size distribution by sieve analysis by ASTM method D422.

2.2.4 Cone Penetrometer Tests

Gregg In Situ, Inc (“Gregg”), under subcontract to of Ninyo & Moore, performed a total of 36 Cone Penetrometer Tests (“CPTs”), 32 CPTs to 20 ft bgs, three CPTs to 45 ft bgs, and one CPT to 60 ft bgs, shown on Figure 3. Gregg used a 20-ton capacity rig with a tip area of 15 cm² and friction sleeve area of 225 cm². Soil data were collected in the field and processed for tip resistance and friction ratio by depth, as well as interpreted Standard Penetration Test N-values, undrained shear strength, internal friction angle, and

soil classification. A summary of the CPT data collected and processed by Gregg is included in Appendix B. Three CPTs (B1CPT-001, B1CPT-003, and B1CPT-005) were located directly adjacent to exploratory trenches excavated previously as part of the treatability test or as part of this pre-design investigation and were used to correlate the CPT readings with visual observations of the depth and thickness of overburden and organic residue, and the depth to first encountered Bay Mud.

2.2.5 Decontamination of Sampling Equipment

The backhoe bucket was decontaminated each time before moving from one trench to the next using shovels or brooms to dislodge accumulated dirt. When organic residue, stained and oily soil, or other soil adhered to the bucket, the bucket was further cleaned with brushes and a solution of Alconox® detergent. Decontamination of the backhoe bucket was carried out over the open trenches after they had been backfilled with residue and stained and oily soil. Decontamination was achieved by rinsing the equipment with a solution of Alconox®, followed by rinsing with clean water, then rinsing with distilled water. All disposable sampling equipment was discarded after each use.

2.2.6 Restoration of Sampling Locations

After sampling and logging were completed by Ninyo & Moore at each exploratory trench location, the excavated materials were replaced into the trenches. Any separately stockpiled and visually un-impacted soil from layers underlying stained and oily soil and otherwise un-impacted soil was placed into the bottom of the trench. Excess stained and oily soil or otherwise impacted soil was then placed on top of the un-impacted soil, then covered with at least three feet of stockpiled overburden soil.

The backfilled trenches were lightly compacted by wheel rolling using the backhoe. In areas where the initial surface was paved, surface materials were restored with hot asphalt patch. For the two trenches excavated in Bataan Avenue, imported backfill was compacted in eight-inch lifts using a hand compactor or tamper to 95% of maximum dry density, as determined by ASTM D1557.

CPT holes were backfilled with cement-bentonite grout in accordance with permit requirements.

2.2.7 Management of Investigation Derived Waste

Gregg collected all decontamination water produced during CPT drilling in a tank beneath their truck and disposed of the wastewater off-Site. No additional decontamination water was collected during Ninyo & Moore's trenching activities.

Ninyo & Moore placed all used personal protective equipment and 10-mil visqueen in four labeled 55-gallon drums. Ninyo & Moore transported the drums to the northeast corner of the Site for temporary storage prior to disposal, as designated by OBRA. These drummed wastes will be disposed by OBRA at appropriately permitted off-site facilities.

Any excess overburden soil from trenching was stockpiled on-site and will be managed by OBRA in accordance with Section 7.4.2 of the Risk Management Plan ("RMP").

2.2.8 Surveying Borehole Locations

The horizontal and vertical coordinates of the corners of each trench and the center of each CPT boring location were surveyed by a licensed land surveyor, subcontracted by Ninyo & Moore. The survey was conducted on 26 December 2003 using traditional survey methods. The horizontal coordinates are reported in +/- 0.25 feet (northing) and +/- 0.25 feet (easting) in the Zone 3 California State Plane Coordinate System, NAD 1983. The vertical coordinates are reported in +/- 0.1 feet in NADVD88 established from NGS Benchmark D-1203. Survey coordinates have been added to the analytical database for the former OARB by EKI.

2.3 SUMMARY OF FINDINGS

2.3.1 General Observations

In general, the soil types, and the thickness and depths of Organic Residue and Stained and Oily Soil encountered during trenching were consistent with prior observations during the Treatability Test field activities conducted by EKI in January 2003 (EKI, 2003b). Overburden soil was generally encountered directly beneath asphalt and concrete cover materials to depths ranging from approximately 1 to 4 feet bgs. Stained and Oily Soil was observed generally south of the former wooden bulkhead in the location of the former ORP facilities. Stained and Oily Soil ranged from approximately 3 inches to 1.5 feet thick. Organic Residue was generally observed north of the former wooded bulkhead directly beneath the overburden, and the Organic Residue ranged in thickness from approximately 3 inches to 1 foot. Beneath the Stained and Oily Soil or Organic Residue, sandy and clayey sediments were observed.

Seven samples of Stained and Oily Soil and one sample of Organic Residue were collected for chemical analyses during the Pre-Design Investigation to supplement prior data. Analytical results for all chemicals detected in these soil samples are reported in Tables 3 and 4. Electronic images of the final, signed laboratory analytical data reports are included on a CD in Appendix B.

Lead was detected above RAP goals in four of the eight samples collected and analyzed for lead, at a maximum concentration of 17,000 mg/kg. Three of the samples (B1TP001-3.5-3.6, B1TP009-4-4.5, and B1TP009-4.5-5) were collected from stained and oily soil. The fourth sample with a lead concentration exceeding Remediation Goals, B1TP005-4.5-5.5, was collected from a visible layer of residue. Arsenic was the only other COC detected above Remediation Goals, at a concentration of 96 mg/kg. No other COCs, including TPHd and TPHmo, were detected in these samples of stained and oily soil or residue.

2.3.2 40-Foot Radius Line at Bataan Avenue and Attu Street

Stained and Oily Soil was observed in the two trenches that were excavated approximately along the 40-foot radius line from the corner of Bataan Avenue and Attu Street (trenches B1TP004 and B1TP015 shown on Figure 2). This 40-foot radius line is for the proposed alternate vehicle route on Attu Street for Port of Oakland tenants that are currently using Bataan Avenue. No COCs were detected above Remediation Goals in the soil samples collected from trenches B1TP004 and B1TP015 (Table 4). Lead, a common COC detected on-Site above Remediation Goals, was detected in these soil samples at a maximum concentration of 130 mg/kg. TPHd was not detected in any soil samples from this area, and TPHmo was detected at a maximum concentration of 12,200 mg/kg, below its Remediation Goal of 58,000 mg/kg. 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, and naphthalene were the only VOCs detected; these VOCs were detected at low concentrations of 1.4 mg/kg, 0.37 mg/kg, and 1.0 mg/kg, respectively. No other COCs were detected above laboratory reporting limits in the soil samples collected within this area.

Based on these data, remedial excavation activities are not anticipated to extend into the “40-foot radius area”, and the 40-foot radius area can be initially utilized by Port of Oakland tenants as an alternate route to Bataan Avenue. However, remedial excavation activities may need to extend into this area once excavation is started and sidewall samples are collected. If the 40-foot radius area is closed to traffic at anytime during excavation, it will be necessary to provide a second alternate route for Port of Oakland tenants.

2.3.3 Building 60

A 3-inch layer of stained and oily soil was observed approximately 10 feet from Building 60 in trench B1TP001 (Figure 2). Analytical results of the soil sample (B1TP001-3.5-3.6) collected from this trench indicated that lead is the only COC detected above Remediation Goals at a concentration of 2,500 mg/kg (Table 4). TPHd was not detected above laboratory reporting limits in this sample, and TPHmo was detected at a concentration of 12,200 mg/kg. 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, and naphthalene were the only three VOCs detected that are listed as COCs for the Site. None of these VOCs were detected at levels exceeding Remediation Goals. No other COCs were detected in this sample above Remediation Goals. Two additional chemicals, 1,2,3-trichlorobenzene and chloroform, which are not currently identified COCs at the Site, were detected at low concentrations in the sample collected from trench B1TP001, i.e., at concentrations of 0.012 mg/kg and 0.017 mg/kg, respectively. Chloroform was also detected in three other soil samples from trenches B1TP003, B1TP008, and B1TP009. Based on the protocols set forth in Section 5 of the RAP regarding the identification of COCs, both of these chemicals have been eliminated as a potential COC at the Former ORP / Building 1 Area.

2.3.4 Building 6

A 6-inch layer of organic residue was observed approximately 10 feet from Building 6 in trench B1TP007 (Figure 2). The presence of this organic residue layer within the immediate vicinity of Building 6 suggests that some organic residue may extend beneath Building 6. Trenches B1TP008 and B1TP009 were also excavated in the vicinity of Building 6. However, no COCs were detected above Remediation Goals in a soil sample of stained and oily soil collected from trench B1TP008 (Table 4). Lead was the only COC detected above Remediation Goals at a concentration of 5,100 mg/kg in a stained and oily soil sample collected from trench B1TP009.

A second soil sample was also collected from trench B1TP009 from a red-colored material that was encountered at approximately 4.5 to 5.0 feet bgs. The material appeared to be construction debris. The sample of the red material (B1TP009-4.5-5) was analyzed for metals, TEPH, PAHs, and SVOCs. PAHs, SVOCs, and TPHd were not detected in the sample of red-colored material above laboratory reporting limits. TPHmo was detected at a concentration of 130 mg/kg. Both lead and arsenic were the only COCs detected above RAP goals at concentrations of 3,600 mg/kg and 96 mg/kg, respectively, in this red-colored material.

2.3.5 Summary of Cone Penetrometer Tests

A total of 36 CPTs were performed during the pre-design investigation. The CPT appears to be an effective tool to distinguish between the various shallow soil layers at the Site (overburden soil, stained and oily soil, organic residue, and underlying sandy and clayey sediments). An ultraviolet (“UV”) tool on the CPT was used to aid in detecting Stained and Oily Soil and Organic Residue. A comparison of the trench logs and CPT / UV logs confirms that soil layers interpreted based on CPT data are generally consistent with visual observations.

Based on the low tip resistance characteristic of the organic residue, and the high UV reading characteristic of oily material, layers of organic residue can be distinguished to a resolution of approximately 3-inches. Stained and oily soil was also identified based on its UV response and higher tip resistance than the residue. The results of the CPT investigations at 36 locations were used to further define the lateral and vertical extents of stained and oily soil and organic residue at the Site, and to further define the initial limits of excavation as shown on Figure 3.

The data gathered during recent CPT investigations indicate the following:

- Overburden soil, or fill material, is a heterogeneous mixture of clay, sand and gravel, which is generally only lightly compacted, or un-compacted beneath former Building 1.
- The first few feet of overburden are compacted beneath parking lot areas.
- A mixture of sandy and clayey sediments is present beneath the organic residue at the Site and extends to a depth of approximately 10 to 15 feet bgs.
- Beneath the sandy and clayey sediments, Bay Mud extends to a depth of at least 40 feet bgs across the Site, and to a depth of at least 65 feet bgs in the center of the site.